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GUARANTEED PRICES AND THE FARMERS

The recent controversy has focussed attention upon the rôle of prices in agricultural production. It may be well to set out some of the theoretical economic considerations that are involved.

FARMING, A SPECIAL CASE ?

The organisation of the farming industry, the nature and psychology of its productive methods, differ from those of machine industry in a number of highly important ways. The classical 19th Century conditions of perfect competition among producers are almost exactly to be found in the industry : numerous small producers, and nothing to distinguish the output of one producer from another. The lay-out of the land for production has changed very little since 1880, and in some areas, since it was enclosed. By the outbreak of war, home-grown fodder and natural manure had been replaced to some extent by imported feeding stuffs and fertilisers, and the labour force had declined, being replaced in part by machinery. But, as the experience since 1939 has shown, there were many improvements in production technique that research, and the practice of the best farmers, had long indicated, but which were not in general operation.

At the same time, machine industry was moving from perfect competition towards a system of monopolies, and it is pertinent to enquire why changes of an equivalent degree have not taken place in Agriculture.

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It is true that the increase in real income has been devoted proportionately more to non-agricultural consumption than to agricultural, but there has still been a sufficient increase in food demand to warrant the introduction of changes in production methods. Why, then, did large scale production and monopolistic trends not develop in agriculture ? In the first place the financial incentive is by no means as strong in agriculture as it is elsewhere. For the marginal producer the concept of 'normal profits' has no meaning (if indeed it has anywhere). Subnormal profits will not induce him to seek alternative opportunities : to the small holder or marginal hill farmer the only alternative occupation is that of a skilled labourer in some other district. Even though the remuneration of such employment—or of industrial employment—may well be higher than their current receipts in a bad year, bad years must follow each other for many years before such producers will leave the industry or change their methods. The transfer of activity and capital to other channels is difficult in any case, but added to this there are always the non-monetary factors of inertia and ignorance of possible alternatives at the one extreme, and the desire not to abandon a chosen or accepted way of life at the other, so that the possibility of recouping losses by bumper yields next year tends to make producers hang on. The normal short term reaction to a fall in price is longer hours of family labour, i.e. the peasant's reaction is greater output.

That these considerations do not apply to the whole of the agricultural producers in this country is not denied. There are certainly a large number who react to price changes in a more usual way. But this reaction is neither as immediate nor as certain as in industry. Production is always a relatively long term business. In shipbuilding alone do we find anything comparable to Agriculture in the period elapsing between the decision to produce and the receipt of income. And we have as yet no Kayser in Agriculture. To-day's price is not particularly relevant to to-day's production plan : it is the expected price from four months ahead for pigs, to two years for cattle that determines, or should determine production. More particularly is this so where expansion of output is under consideration and new capital equipment is required : for the life of new capital in the form of breeding stock, buildings, or fruit trees is, on the average, considerably longer than in machine industry. And, since with given technique diminishing returns quickly set in, increases in out-put can generally be obtained only either at much higher cost, or by changes in technique.

Foreseeing the price which will be fetched by the output of current input has always been a nightmare of the farmer. It is complicated further by the perishable nature of most of his output and by fluctuations due to climatic or other conditions.[1] Is it then a wonder that many farmers have in the past given up the struggle to adapt production in price, or have caused the Pig Cycle and its parallel phenomena by taking current price as the most likely indication of future price ?

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[1] Note, however, that the effect of yield fluctuations on the **total** profits on any one farm depends upon how far it is specialised. Thus the general mixed farmer's income probably does not vary by more than 5—10% due to this factor, since a bad year for one crop may be a good year for another or for livestock, but the producer mainly concentrating on soft fruits might well have a 50% variation in net income.

And is it any wonder that guaranteed stable prices have always been the farmers' main demand ?[1]

THE PROBLEMS AND PERPLEXITIES OF GUARANTEED PRICES IN PEACE.

Guaranteeing prices for a considerable period of time to any body of producers is to break down one part of the price mechanism of the competitive set up.

Free competition served the vital purpose of forcing all producers to adopt the most efficient methods of production or to go bankrupt. Now to guarantee to all farmers a price which covers the marginal costs of the least efficient, is completely to remove this stimulus. The marginal producer makes a good living, and will not be under any necessity to lower costs. There will be some increase in output from the low cost producers who may increase their output until, with their present technique, their marginal costs reach the guaranteed price level. There will then be an increase in output in the near future, but one that has been produced by techniques that have been unchanged and therefore less cheaply in terms of resources used than free competition would have secured.

Some increased output, but at a rising cost, is then the likely result of attempting to fix prices so that all producers are satisfied. In conditions where increase in output is *not* required, this is a nuisance, to say the least. Fixing a ceiling to the amount that will be purchased at the guaranteed price, and making the average price decline slowly (and hence the marginal price sharply) after that point has been reached, would appear to discourage overproduction, but it suffers from the disadvantages that the determinant of production is still expected price, and expected price is almost certainly 'guaranteed' price. It may protect the Exchequer, but it is doubtful whether it discourages production, and if it does have any such effect it will be among the low cost producers (and, probably, among those most likely to improve their technique).

To secure a rising output, the method of a guaranteed price based on the costs of the marginal producer, suffers from the defect that to call out the required increase of supply, prices must be set so high that the marginal producer is encouraged to increase production and some submarginal producers to enter production. When this is done, the low cost producer is able to obtain an extremely high income with no increase in production or change in technique, and has therefore very little incentive to expand. Administratively more difficult, but economically more sound, would be a system of differential prices according to the costs of particular areas : by this means it would theoretically be possible to call out that production in each area that would be produced at lowest cost, with the technique suited to the physical features of that area and the current farming organisation.

Lowering prices to obtain a contraction of output is probably more effective : the monetary incentive to reduce the volume of production operates at once. It is particularly effective, if at the same time the prices of other substitute products are raised, and an alternative form of production is therefore possible. But this must be qualified to the extent that some producers react to lower incomes by increasing output (see above).

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[1] But notice that very few farms are producing only one type of output, and therefore the farmers' reaction, in so far as he does react to price, is to **relative** prices of substitutes in production.

If the State accepts the responsibility of guaranteeing agricultural prices, it becomes also its duty to watch their effects on other sections of the population and to minimise the burden of price protection on the consumer. Price guarantees which, as argued above, tend to reduce the incentive to efficiency, must therefore be accompanied by a variety of measures to promote and to enforce the best use of farming resources. Guarantees without the obligation to persistent change in the direction of efficient organisation and production are sectional protectionism, producing a clash between the interest of the community as a whole and the farming fraternity.

THE EXPERIMENTS OF THE 'THIRTIES.

Some check on protectional exploitation was introduced under the original Wheat Act of 1932, and later applied to barley, oats and sheep. But producers had attempted to obtain price stability in a number of other products by a different road, i.e. by forming themselves into what were essentially selling cartels. The 1920's saw numerous attempts to organise these on a basis of co-operative voluntary membership but the reluctance of low cost producers to carry the less favoured producer on their shoulders caused most of them to fail. The extremely low prices of 1929—1931, and prices so low that all producers' profits were in jeopardy, resulted in the co-operative organisation being made compulsory and the establishment in the Marketing Boards of state sponsored selling cartels. These were composed entirely of producers (with the notable exception of North Ireland). Where they were mainly regulating bodies, e.g. the Potato Board, they smoothed out price fluctuations within the season and secured orderly marketing : where they were purely trading bodies, e.g. the Hops Board, they acted as monopolists, securing powers to prevent new entrants to production, and also obtaining a price fixed over a number of years. Where they had both trading and regulatory functions, e.g. the Milk Marketing Board, though they had no powers to prevent new entrants to the industry, and indeed, had no need to as demand was rising, they were concerned mainly with securing as high a price as possible. They were in fact organisations, set up by the State, which secured producers stable or rising prices over a considerable period of time, without being used by the State to influence the size of output or the efficiency of production.

Neither State guaranteed prices nor State supported cartellization gives a method of controlling output which does not either lack certainty or encourage the continuation of inefficient technique. To secure a lower real cost of production or a higher quality product other methods would seem necessary. Direct subsidies to encourage changes of technique might if pushed through very vigorously be successful; price differentials for graded products, regional differentiation of prices improvements in agricultural training and research facilities, and other methods may usefully be tried.

These methods seem particularly applicable when a superior technique is already being used successfully by more enlightened producers, and the stepping up of the national average technique is merely a question of supplying capital and overcoming ignorance and inertia. Combined with these, or alone where the new technique is not immediately obvious, a useful weapon would appear to be a fixed price, that is guaranteed for the current year, but which will fall by a small proportion (say 1%) each year until a basic figure be reached when a review of the whole price question shall be undertaken.[1] The vital criticism of the price stabilisation policies of the 'thirties was that in no one of them was the necessity to secure *efficiency* in production sufficiently realised or enforced. High cost producers remained in production and low cost producers had relatively little incentive to expand. At the same time competitive low cost overseas products were being given only restricted entry to the British market.

WARTIME POLICY

With the outbreak of war the needs of policy changed. We are at present not concerned with concentrating a limited production upon the cheapest producers, and importing the balance. Our objective is, or ought to be, the highest possible production of human feeding stuff per acre of agricultural land. The low cost producer must be persuaded, cajoled or driven to go on producing up to the physical maximum of his land and the other available resources. At the same time all improvements that are practicable must be introduced to high or low cost producers alike and their acceptance encouraged by subsidy for that particular purpose.[2] Yet raising the guaranteed price is not, as we have seen, enough : for a price large enough to call out any considerable increase from the sub-marginal producer is likely to give the low cost producer such an exorbitant income with a moderate expenditure of effort, that the incentive to expand his output becomes very low once increasing marginal managerial effort is required.

The problem, however, is not simply that of increasing the over-all production of British agriculture. Production has had to be redirected into channels dictated by nutritional and shipping urgencies. The control of cropping by the W.A.E. Committees has not been absolute, and the individual farmer is still allowed considerable latitude. The fixing of price relations has been the main method used ; and the relative attractiveness of the 1940 price of barley shows how sensitive farmers can be to such price relatives.

A second new factor in the war-time set-up is the presence of E.P.T. and higher Income Tax. To most farmers who are already paying E.P.T. prices have ceased to be any sort of determinant : for as long as they remain liable to E.P.T. they can gain nothing by greater efficiency and lose little by lower prices or higher wage rates. To those who are not paying E.P.T., or who may cease to pay it, the high rate of Income

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[1] This implies, of course, keeping prices of farmers' requisites fixed. By the price of the output is meant, of course, price relative to the prices of production substitutes.

[2] If they are not, farmers (with one eye on post-war conditions) will be reluctant to undertake them, and in any case may not be able to undertake them until the next harvest provides funds for the investment.

Tax by reducing their net money income provides an incentive to increase production so long as increased marginal managerial activity is not discouraged by the lower marginal returns allowed by a 10/- in the £ rate of Income Tax.

GROSS OUTPUT, PRICES AND COST.

The gross value of the agricultural output of England and Wales in 1938-39 may be estimated at about £250,000,000. Mr. Hudson in his Leeds speech is reported to have said that it is now of the order of £600,000,000. In the meantime the Agricultural Price Index number, the current reliability of which is not very clear, is last quoted (August 1942) at about 160 points compared with 90.5 points in 1938-9 base) 1927-8 to 1929-30=100). Thus we get

	1938—9	*1942—3*
Value of Gross Output £mn.	250	600
Price Index	90.5	160
Value at base prices £mn.	280	380

or an increase in physical production of just about one-third. The calculation does not bear too close examination, but it does suggest that the increase in productivity of labour has been considerable.

An exact examination of the movements in cost is not possible. Indeed we know relatively little about them even in peace-time, and it should be obvious that any system of price guarantee requires regular and comprehensive agricultural censuses to ascertain the facts on which to base policy. The main factor which has greatly changed is that of labour. The calculations of ' Statistician ' in the *Manchester Guardian* of January 8th, recently supported by Mr. Hudson, estimate the recent rise in wages to 65s. per week as being likely to cost the industry £9,000,000 ; and the total increase since 1938-9 as being from about £50,000,000 to about £110,000,000.

It is now argued by the farmers that the new wage-rates and prices announced will result in a loss of £9,000,000 to the farmers. This seems to be based on figures such as these :

	£mn.			£mn.
Increased wages	12	(Farmers' figure)	Increased price for milk	5
Decrease in barley price	3½		Increased price for fat cows	1½
	15½			6½

If we substitute a figure of £9,000,000 for the increased wages we at once reduce this estimate of loss to £6,000,000. Seen by itself this seems a large figure. As a percentage of total gross output it is 1%, less than the cost of introducing the Beveridge scheme to agriculture! But even these figures cannot be allowed to go undisputed. In the first place these calculations, relating as they do to the industry as a whole, tend to give a rather distorted view of the effect upon individual farms. The small family farm producing mainly milk—the great majority in number if not in acreage—will have little increased money costs to bear but will benefit considerably from the milk price increase. The eastern counties barley producer with larger acreage and more employed labour will suffer under both headings. The specialised hill sheep farmer, the market gardener, the fat cattle producers will all suffer from increased labour costs, but neither in number nor acreage are they now considerable. To the vast majority of British producers, the mixed farmers, the effect will depend upon the relative importance of milk and barley in their output.

Secondly, the farmers are not justified arguing on the assumption that the relative outputs of last year will continue. It must be presumed that the change in relative prices was designed to induce a shift in output. If, under the impetus of relative price changes, the barley producers turn back to wheat, and the mixed farmer increases his milk output, there is every reason to believe that the industry's gross income will decrease by far less than £6 million and might increase. To secure this most desirable increase in human food production the price mechanism may most legitimately be used.

Nor is it by any means certain that the income of barley producers, net of tax, will in fact be much reduced. For it is common knowledge that over-high prices linked to bumper crops have given the barley producers in the very immediate past gross incomes that may almost be described as exorbitant, and which were largely removed in the form of E.P.T. Higher wage costs and lower prices, even if they do not cause a switch back to wheat, will in many cases result only in lower receipts for the Exchequer and a relatively unchanged income for the producer. Since incomes currently earned from barley production are such as to produce Excess Profits, the Minister of Agriculture cannot hope to cause a switch to wheat by raising wheat prices. Offering a higher gross but equivalent net income obviously will have no effect. The only way (and that a weak one) is to produce those price conditions that will bring producers out of the E.P.T. levels unless they change to wheat.

The conclusion seems inescapable that, though some producers may naturally be disappointed that high incomes are not to be continued without some adjustment of production, there is nothing in the new scale of prices which is not in accord with the national interests.

R. S. G. RUTHERFORD.

Agricultural Economics Research Institute.

THE DISTRIBUTION OF INCOMES

1. THE DISTRIBUTION OF PRIVATE INCOME IN 1940-1 AND 1941-2

The data which are available on the distribution of incomes in this country are, in several respects, incomplete. The White Paper on War Finance (Cmd. 6438) gives estimates, relating to the financial years 1940-41 and 1941-42, of the total private income, before and after direct taxation, in broad income ranges. The number of incomes is given for the ranges above £250 per annum, but not for the large group of incomes under £250. Also, the incomes of husband and wife are reckoned as one, so that the figures do not refer exactly to the number of income recipients ; nor do we have the distribution of incomes per family. If all individual incomes were reckoned separately, and those of wives counted apart from their husbands', the number of incomes in the lowest group would be substantially increased, while the aggregate income in this group would be only slightly increased.[1] On the other hand, the incomes of juveniles are included on a par with those of adults and it might be held that their incomes are not strictly comparable.

It is further stated that ' The whole of transfer payments other than National Debt interest has been included in the incomes below £250.'[2] If transfer incomes are to be included, this is a reasonable assumption to make, so long as it is remembered that, in effect, transfer payments are then included twice in the total of incomes before taxation.

Working on the basis of the figures given in the White Paper, an estimate requires to be made of the total number of incomes, and hence of the number of incomes under £250 p.a. The total number of persons, aged 14 to 64, who were gainfully employed in September 1943 was given by Mr. E. Bevin as 22.75 million, including 700,000 part-time women ; he also stated that 1 million men and women over 65 were in full-time paid employment in the war effort.[3] This gives a total, excluding those over 65 who were employed, but not in the war effort, of 23.75 million. The number of married women in full-time gainful employment in April 1943 was given as 2½ million.[4] The incomes of husband and wife being reckoned as one, we must exclude married women from the total number of employed persons. Women employed part-time (some of whom may be married) are also best excluded ; their incomes are included, but the amount is sufficiently small to be ignored. The total number of incomes in 1943 may be estimated, therefore, at approximately 20.5 million[5] and we shall assume the same number for the financial year 1941-42. For the previous year, when the number would have been slightly less, we shall assume 20 million. These are quite rough estimates, which, however, do not affect most of the subsequent analysis. They are probably too low, rather than too high, since a number of transfer incomes are also excluded.

The distribution of private incomes in 1940-41 and 1941-42, that is, of incomes *received* in these years, is shown in Table I. The terms gross and net income refer to incomes before and after direct taxation, at the rates current in each year.

The effects of income tax and surtax are shown in the quite different distributions of gross and net income ; the changes between the two years being partly the result of reductions in allowances and increases in the rates of income tax in July 1940 and April 1941.

Unfortunately, it is not possible to compare these figures with those published for 1938-39 and 1941-42, which were discussed in a previous note.[6] The earlier statement referred to income tax assessments for each year, which are based partly (under Schedules D and E) on incomes received in the previous year,[1] and excluded a large part of incomes in the lowest ranges, as well as transfer payments. It is known, also, that some of the estimates have been considerably revised.

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[1] Through the transfer of some incomes at present included, together with husbands' incomes, in the higher ranges.

[2] Cmd. 6438, p. 11.

[3] Statement in the House of Commons, 23/9/43.

[4] Statement by Mr. E. Bevin, 30/4/43.

[5] This figure excludes retired persons, some of whom are included in the numbers shown in the White Paper.

[6] BULLETIN Vol. 4, No. 12.

TABLE I.

The Distribution of Private Income.

Range of Gross Income £ p.a.	Number of Incomes 000's	%	Aggregate Gross Income £ mn.	%	Aggregate Net Income £ mn.	%
		1940/41				
under 250	15,580	77.9	3,328	57.5	3,302	63.7
250—500	3,295	16.5	1,069	18.5	984	19.0
500—1,000	770	3.9	516	8.9	411	7.9
1,000—2,000	250	1.2	345	6.0	245	4.7
2,000—10,000	97	0.5	360	6.2	197	3.8
over 10,000	8	0.04	170	2.9	48	0.9
Total	20,000	100	5,788	100	5,187	100
		1941/42				
Under 250	14,610	71.3	3,398	52.3	3,307	59.8
250—500	4,450	21.7	1,490	22.9	1,276	23.1
500—1,000	1,050	5.14	685	10.5	495	9.0
1,000—2,000	285	1.4	400	6.2	245	4.4
2,000—10,000	97	0.5	360	5.5	170	3.1
over 10,000	8	0.04	170	2.6	35	0.6
Total	20,500	100	6,503	100	5,528	100

It appears, from these figures, that the average gross income in the lowest grade, of incomes under £250 p.a., was £214 in 1940-41 and £233 in 1941-42. It is unlikely that the averages in this grade are, in fact, as high as this, so that the total number of incomes, from which the number in this grade is derived, has probably been under-estimated, as mentioned above. Both for this reason and because the numbers do not include married women, the degree of inequality in the distribution of incomes, according to the number of persons, would be greater than the table indicates. More information is clearly required as to the number of incomes and it would be useful if the distribution could be given for a larger number of income brackets, as well as for other years.

2. PARETO'S AND GIBRAT'S FORMULAE

The present data, though not as complete as might be desired, can be used to throw some light on the problem of representing the distribution of gross incomes by a mathematical curve. In its simplest form, Pareto's well-known law can be written :

$$\log y = \log A - \alpha \log x,$$

where y is the number of incomes above £x. This formula has been applied to the figures given above, with results which are shown in Table II, under the heading, Pareto I.

In a more general form, Pareto's law can be written :

$$\log y = \log A - \alpha \log (x - x_0),$$

where x_0 is some arbitrary point, to be determined from the data. This formula has also been applied, with results which are shown in

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[1] In the earlier note, referred to above, this factor was left out of account.

Table II, under the heading, Pareto II. It is clear that the second and more general form, in which x_0 is given the value of 40, yields better results than the first.

These formulae cannot be applied to incomes under £250, since it is not known what is the lowest income. But according to the Pareto law, in either of these two forms, the numbers increase as income diminishes and it is most unlikely, therefore, that the law would apply to the lowest range of incomes. In the present case, it was also found that the law did not apply very well, in either form, to incomes over £10,000 p.a.

When the aggregate incomes in each range are estimated from the equations to the second form of Pareto's law, the agreement is found to be fairly close for the four highest groups, but not for incomes below £500, in 1940-41; and in 1941-42 it is fairly close only for incomes between £500 and £10,000 p.a. Incomes estimated from the first form of the law, as may he seen from the Table, do not agree so well.

An alternative method of representing the distribution of incomes, which is derived from the Normal Curve of Error, has been suggested by Gibrat.[1] If the Normal Curve is denoted by

$$N(z) = \frac{N}{\sqrt{2\pi}}\, exp \left\{ -\tfrac{1}{2}z^2 \right\}$$

and the derived curve by $N(x)$, the transformation is made by substituting

$$z = a \log (x - x_0) + b$$

and equating areas on the two bases, dz and dx, so that

$$N(z)\, dz = N(x)\, dx.$$

The introduction of logarithms causes the normal curve to be transformed into a skew curve, which Gibrat calls the law of proportional effect. ' La loi de l'effet proportionnel se traduira donc par le fait que les logarithmes de la variable seront répartis suivant la loi de Laplace.'[2]

When this curve is applied to the present data, against the number of incomes, the values of z and of $\log (x - x_0)$ are found to lie approximately on a straight line when $x_0 = 170$. As shown in Table II, the numbers given by the formulae agree fairly closely with the original data, except for the top range, of incomes over £10,000 p.a.

When the corresponding incomes are estimated, it is found that the law does not apply to the group of incomes under £250, and it is known, indeed, that the minimum income is not as high as £170. The Gibrat formula accounts quite well, however, for the distribution between £250 and £10,000 p.a.

The equations, from which the figures given in Table II were derived, are given overleaf, with the notations mentioned previously. These equations were estimated by the method of least squares, but in each case the top point, corresponding to incomes above £10,000, since it was found to lie off the line formed by the remainder, was excluded from the computation. Here logarithms all refer to the base 10.

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[1] R. Gibrat, *Les Inégalités Economiques*, Paris, 1931.

[2] Op. cit. p. 64.

1940/41

Pareto I $\log y = 10.9033 - 1.7850 \log x$
Pareto II $\log y = 10.5013 - 1.6641 \log (x - 40)$.
Gibrat $z = 1.3141 \log (x - 170) - 1.7316$

1941/42

Pareto I $\log y = 11.3887 - 1.9314 \log x$
Pareto II $\log y = 10.9517 - 1.7999 \log (x - 40)$
Gibrat $z = 1.4800 \log (x - 170) - 2.2532$

The degree of equality or inequality in the distribution of incomes is indicated, in Pareto's formulae, by the value of α, the coefficient of log x or of log $(x - x_0)$; and in Gibrat's formula by the value of a, the coefficient of log $(x - x_0)$. The increase in the value of each of these parameters between 1940-41 and 1941-42 is evidence of a slight, but significant,[1] reduction in inequality. Since the value of α in the first form of Pareto's law was found[2] to be approximately 1.68 in 1938-9, there appears to have been a continuous tendency, during the war, for inequality in the distribution of *gross* incomes to become slightly reduced. Changes in the inequality of distribution of *net* incomes, reflecting increases in direct taxation, have of course been more marked.

TABLE II.

The Distribution of Private Income—Comparison of Data and Formulae

Range of Gross Income £ p.a.	No. of Incomes (000's)	Nos. (000's) given by formulae : Pareto I	Pareto II	Gibrat	Agg. Gross Income £mn.	Aggregate Gross Income (£mn.) given by formulae : Pareto I	Pareto II	Gibrat
1940/41								
Under 250	15,580			15,584	3,328			2,973
250—500	3,295	2,980	3,159	3,271	1,069	1,000	925	1,088
500—1,000	770	865	829	792	516	581	524	544
1,000—2,000	250	250	241	247	345	338	314	344
2,000—10,000	97	97	98	102	360	334	341	358
Over 10,000	8	6	7	4	170	132	176	79
Total	20,000			20,000	5,788			5,386
1941/42								
Under 250	14,610			14,625	3,398			2,854
250—500	4,450	4,221	4,474	4,435	1,490	1,411	1,303	1,457
500—1,000	1,050	1,106	1,058	1,043	685	740	664	699
1,000—2,000	285	290	278	294	400	387	361	394
2,000—10,000	97	98	100	100	360	333	340	330
Over 10,000	8	5	6	3	170	95	128	41
Total	20,500			20,500	6,503			5,775

3. ON THE SIGNIFICANCE OF THE FORMULAE

The equations of Pareto and Gibrat are different in appearance and may be thought to have different implications. Pareto himself had contrasted his formula with the Normal Law of Error and argued that chance factors could not explain the form of the distribution. 'La répartition des revenus n'est pas l'effet du hasard,' he wrote.[1] This conclusion was challenged by Gibrat, who showed that a curve which was derivable, by means of a logarithmic transformation, from the Normal Law, gave an adequate description of the distribution of incomes in many cases. It may be interesting, therefore, to compare the forms of the two curves.

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[1] The sampling errors of the differences, in the cases both of Pareto II and Gibrat, are associated with probabilities of less than 1 in 20.

[2] BULLETIN Vol. 4, No. 12, p. 225.

In the Gibrat formula, shown above, the number of incomes at a particular level of income is given by:

$$N(x) = N(z)\frac{dz}{dx} = \frac{N}{\sqrt{2\pi}} . \frac{a}{x - x_0} \, exp\left[-\tfrac{1}{2}\left\{ a \log (x - x_0) + b \right\}^2 \right]$$

Therefore

$$\log N(x) = \log\left(\frac{Na}{\sqrt{2\pi}}\right) - \tfrac{1}{2}\left\{a \log (x - x_0) + b\right\}^2 - \log (x - x_0)$$

and this is of the form:

$$\log N(x) = b_1 + b_2 \log (x - x_0) - b_3 \left\{\log (x - x_0)\right\}^2$$

where natural logarithms are now referred to.

According to the Pareto law, in the second form mentioned above, the number of incomes at x is given by:

$$-\frac{dy}{dx} = \frac{\alpha}{x - x_0} . y = n, \text{ say,}$$

so that: $\log n = \log \alpha + \log A - (\alpha + 1) \log (x - x_0)$,

which is of the form:

$$\log n = c_1 - c_2 \log (x - x_0).$$

Gibrat's formula can therefore be represented by a quadratic function, Pareto's by a linear function, of $\log (x - x_0)$. The values of x_0 which give the best fit in each case will not, however, generally be the same; in fact, we can expect the value obtained from Pareto's equation to be less than that obtained from Gibrat's formula. It should be noted, also, that b_2, b_3 and c_2 are essentially positive, so that the coefficients of the independent variables have the signs indicated. It is only, therefore, over the range where the number of incomes declines, as income increases, that the curves could both describe any given distribution of incomes. The Gibrat curve, expressing $\log N(x)$ as a function of $\log (x - x_0)$, within a certain range, gives approximately a straight line; and the curvature of the line can, of course, be reduced by altering the value of x_0.

Thus, the form taken by the distribution of incomes, at any rate over a wide range, can be derived from the Normal Curve; and the relation given above provides at least a partial explanation of why the distribution often conforms, also, to the simpler equation given by Pareto. It is worth noting that Edgeworth[2] had suggested, as a possible explanation of the Pareto Law, that if means and faculties were originally distributed according to the law of chance, an abnormally protuberant curve might eventually result from an application of the principle: Unto him that hath shall be given.

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[1] *Cours d'Economie Politique*, p. 315.

[2] Journal of the Royal Statistical Society, 1924, vol. lxxxvii, p. 573.

When, however, Pareto's law is used to deduce general principles, such as that the distribution of incomes is, in some sense, inevitable, it is apparently done in defiance of the warning which Pareto himself gave : 'Ce n'est là qu'une loi empirique.'[1]

While the formulae, which have here been discussed, can be used to account for the distribution of incomes over most of the range above £250, they do not, evidently, explain the distribution of incomes below this level. But in order to determine the form of the distribution of the smaller incomes, in this country, it would be necessary to have information in greater detail than is at present available.

J. L. NICHOLSON.

RATIONING AND PRICE CONTROL.

It has been stated time and again that price control without rationing is not effective in combating inflation.[2] The inflationary tendency arises when the demand for consumption goods exceeds their supply at current prices, and therefore prices tend to increase. If they are fixed at the existing level the discrepancy between demand and supply must show itself in queues and shortages and the distribution becomes haphazard. The reply to the opposite question, whether rationing makes price control unnecessary, is much less obvious. We shall start from the simple case of rationing of one commodity and then pass to the more complex one of the point rationing scheme.

1. Imagine that rationing of a certain commodity has been introduced. The first requirement that it shall be effective in preventing the increase in price of this commodity is that the rations should be fixed at such a level as to match the available current supplies. If the ration is 'too high' the price will tend to increase. In some cases, however, prices may rise after rationing even if the ration *has* been properly matched with the available supply.

Imagine that rationing is introduced at the stage where there is a *tendency* for inflationary price increases, i.e. for the rise of prices out of proportion with prime costs, but that this has not happened in the past. In other words, the ratio of price to prime costs is still 'normal,' but there is a tendency for this ratio for increase under the pressure of demand. The introduction of rationing brings into equilibrium the quantities demanded and supplied. Prices may nevertheless increase for a different reason. It seems fairly likely, at least for some commodities, that rationing reduces the sensitiveness of customers to price differences as between various sources of supply. Thus the market becomes more imperfect ; competition becomes less keen ; and the price may increase although the disequilibrium between demand and supply has been removed by rationing. To prevent this, price control is required.

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[1] *Cours d'Economie Politique*, Preface, p. iv.

[2] For instance, M. Kalecki, 'What is Inflation ?' BULLETIN Vol. 3, No. 8.

2. We see that there are some reasons for accompanying rationing by price control if we want to keep the price at the level which prevails at the time when rationing is introduced. We are going to show now that price control is even more important if we want to reduce the price. Such will be the case, for example, when rationing is introduced after a certain measure of inflation has taken place, i.e. after the price of a given commodity has risen appreciably in proportion to its prime costs under the pressure of demand. Can we expect that rationing by itself will do the trick ? The reply is rather negative.

First, rationing is usually combined with a quota system, i.e. the allocation of supplies to firms in certain fixed proportions. As a result, after rationing which matches the current supplies has been introduced the firms cannot tend to increase their sales by competing with one another. But even if we assume that this factor is not effective because rations have been fixed somewhat below the level matching the available supply, there is another reason why it is very uncertain whether prices would fall. As already mentioned, rationing may cause the market to become much more imperfect and this will prevent competition from getting the price down.

The most effective way, then, to reduce the prices to the ' normal ' level, i.e. to the level which shows a ' normal ' ratio to prime cost, is price control. It should be added, however, that if prices are reduced considerably below the level they have previously reached, it may necessitate some reduction in the ration. For the reduction in price may increase demand somewhat by inducing those people who at the old price did not use fully their coupons to increase their purchases.

To sum up : in order to reduce the inflated price it is necessary to accompany rationing by price control. The ration in general must be somewhat lower than that which would match current supplies at the price which was in existence at the moment of introduction of rationing.

3. All the conclusions arrived at above are applicable to a point scheme. The ration in terms of points must match the current supplies in terms of points. Price control is desirable if it is intended to keep the prices at the level prevailing at the moment when rationing is introduced. It is necessary if it is intended to reduce the prices below this level. There are, however, additional problems to be considered. We are now dealing not with one good but with an aggregate of goods. That demand and supply are equilibrated by rationing for all goods in terms of points does not mean that such an equilibrium exists for each of the goods in question taken separately. Demand and supply for single goods may be adjusted either by the automatic movement of uncontrolled prices or by changes in point values i.e., in points necessary to purchase a unit of a given good.

We shall argue that the latter is the preferable way. The system of prices should be controlled while demand and supply for single commodities should be brought into equilibrium by varying the relative point values. This may be supplemented by changes in the relations of controlled prices.

It may be shown that if such adjustments are left to the ' free play ' of prices it is by no means certain that the price index of the commodity group considered would not increase. Take, for instance, the case when we have two commodities A and B in the point scheme. Let us assume that the total number of points in the ration is divided equally between these two commodities, and so is their value in terms of money. Imagine now that the demand shifts from A to B, while the supply of either commodity is fixed. Imagine further that A has closer substitutes among the commodities outside the group than B. Then the relative price rise in B will be higher than the relative price fall in A and the price index of the group will rise. Of course, when demand shifts from B to A there will be a decrease in the price index of the group.

There is, however, a factor which makes for a tendency for the price index of the group rather to rise than to fall when demand shifts from one commodity to another. So far we have assumed that price changes have to be such that the volume of sales of either commodity would remain unchanged. In fact, that will be true only of the commodity in greater demand if its supply cannot be increased. But the price of less demanded commodity may not fall at all or at least not enough to prevent a decline in the volume of its sales ; the fall in demand may cause a reduction in supply or an increase in stocks.

It follows that the best way to stabilise the price index of the group is to keep the prices of commodities concerned under control and change the relative point values until equilibrium of supply and demand is achieved for all commodities. It may be useful to supplement this measure by changes in the relations of the controlled prices, in particular when a large part of the consumers do not use their coupons fully and thus are not subject to the influence of changes in relative point values. We may thus conclude that in the case of a point scheme price control is desirable for additional reasons and that it should be combined with variable point values.

4. An interesting illustration of the above may be found in the developments which took place in the first year of rationing of clothing and footwear when it was unaccompanied by price control. After the introduction of rationing in June 1941, the retail price index of the Ministry of Labour continued to rise until March 1942, the total rise in that period having been about 10 per cent. It is true that in the same period there was some rise in the prices of raw materials and wages in this sector, but from all that we know the order of these changes was not such as to justify the increase in the prices of finished products by 10 per cent. We also know that in the same period a shortage of cheaper goods was noticeable and probably it is mainly their prices that caused the increase in the price index.

The rise in prices after the introduction of rationing might have been due to the rations being too high in relation to the available supply. But the shortage of cheaper goods points to another factor which might be even more important in this context. The shortage of cheaper goods was most probably due to a *relative* shift in demand. The rationing of clothes and footwear cut severely the consumption of the higher income groups while that of the poor was little or not at all affected.[1] The

[1] This influence was probably more important than the tendency of individuals to buy better quality goods for their coupons.

structure of production, however, did not adapt itself to this change for some time. (The quota of firms specialising in production of cheap and expensive clothing were probably reduced in the same proportion initially.) As a result there was a tendency for cheaper goods to increase in price while the prices of more expensive goods did not fall.[1] Thus there was a tendency for the price index of clothing to increase even independently of the fact that the rations might have been fixed a little too high in relation to the available current supply.

After a certain time, in order to accelerate the change in the structure of production, price controlled utility goods were introduced. As a result after March 1942 the price of clothing ceased to rise and, in September started to fall. The analysis of the extent to which this fall was due to the pressure of price control or to the reduction in costs of production of utility goods and their exemption from purchase tax is beyond the scope of this paper.

5. It follows from the above argument that it is always useful and in most cases necessary to supplement rationing by price control. This conclusion is of some practical importance for the post-war transition period. As long as some commodities are in scarce supply both rationing and price control must be maintained. And even after rationing is made unnecessary by ample supplies, price control may be usefully applied for pressing down prices which are 'high' owing to a considerable degree of market imperfection or the existence of industrial monopolies.

M. KALECKI.

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[1] The increased market imperfection resulting from rationing, in particular in goods bought by richer people whose consumption had been cut by rationing much below the level they could afford out of their incomes, may have contributed to this.